

**Dams and Urbanization. Case studies concerning,
History of Developments of some cities in INDIA**

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India has got a very long Historical and Cultural background and as such the study concerning the developments of the various cities indicates some guidelines not only to our Country but also to the entire world as a whole. The Urbanization aspect is basically a Three Point Problem, viz. Social, Economical and Environmental. These three factors directly or indirectly depend upon the most important resource in the World; WATER.

. The availability of this most precious resource on earth is only 2.5% of all the quantity of water (H₂O) available on earth including seawater. If the frozen ice mainly on North Pole and South Pole is excluded, then only 0.26% water is available for drinking and industrial usage. Last thousands of years this is a fixed quantity while the population growth is progressing in geometric progression The general trend of Urbanization, concentration of population in big cities has been decided by the Historical social and economic conditions for the last few Centuries. One of the basic factors is the availability of water resource. This will be clear from the few case studies given in the following paragraphs. The study of the ancient cities in the entire world will show that the civilization development takes place along the river first and gets concentrated where there are better infrastructure facilities. The Cities /Big Towns if situated on riverbanks, cannot survive on run of the river only. Small Minor, Medium and Major projects wherever possible has now become the real need of the time. The Storage, Preservation and Reutilization of Water, going as waste to sea, is a must. There cannot be two opinions about this. In brief the following points are very significant,

1] Construction of all the types of dams for cities, wherever they are technically

Feasible and where there are no cheaper alternatives available.

2] Effective and Efficient use of available water.

3] Treatment and Recycling of Water used.

In order to explain these points by concrete cases and keeping in view the limitations

on the length of the paper, the studies concerning few representative cities in INDIA e.g..Delhi,.hi.Bangalore.Mumbai,Pune,Hyderabad, Jaipore etc .have been given briefly in this paper. Even if we consider about three hundred and odd years period can be considered as ,comparatively recent for India , it is seen that the population has been increased by about two hundred times or more. Keeping in view the Industrial development the Water requirement for Irrigation , drinking

purpose ,Industry and so on has been increased beyond imagination. It is needless to say that water from the Dam Storages by gravity flow is the cheapest of all the alternatives if the feasible technically sound option is available.

Starting from the very important West Coastal City of India viz. MUMBAI which in the early eighteenth century was merely group of seven islands with local fishermen as its only habitants. Today it has grown to be a Megacity with a population of over 12 Millions and is rightly known as the Financial Capital of India. Though there are about eight dams catering the Water supply need , it is hardly meeting about 70%of the total requirement.

As regards the DELHI the capital City of India ,I need not repeat the details readily available but I want to significantly stress the point that the water supply is met with mainly by the dams built in Northern part of India. The development of city for past hundreds of years could take place only because of the Dams / Man made Reservoirs

In respect of PUNE City, situated in Maharashtra State., period of about four hundred years has been considered. The concept of Dams and Development was clear that time also. The population was 4.95 (0.49 M)Lakhs in 1960. In 1991 it was about 21.5 Lakhs (2.15Million). It is projected as 65 Lakhs (6.5 M) in the Year 2021. The Industrial growth is also progressing with this or even at more rates! At present there are three Storages with Total gross Storage of about 29 TMC The fourth dam under construction with about four TMC capacity is nearing completion. This has facilitated the drinking water requirement of about twenty Towns besides Pune city with canals running more than 200 Kms. This has also provided the irrigation facility to the major part of Pune District besides catering for the Industrial Areas where even some International industries are flourishing.

It is seen that many small townships have been benifitted in the command are of the project where sugar factories have come up along with the Industrial Developments. These places have grown up in big Developed Cities .

UDAIPUR City (Rajasthan state) is depending upon Indira Gandhi Canal, the Mega Project. BANGALORE City normally requires 680 MLD of which 540 MLD is provided by the River Cauvery

Dams and Urbanization. PUNE City (Ind-Mah)
(Water use in Mcum)

	Khadakwasia Project				Pawana Project (1972)
	Khadakwasia (1870)	Panshet (1972)	Warasgaon (1992)	Total	
Gross Storage	88	303	374	763	305 (272)
Live Storage	56	294	362	712	274 (241)
Dead Storage	30	9	12	51	31
Water Use					
1) Irrigation				336	47
2) Non Irrigation-					
a) Domestic				285	137
b) Industrial				15	33
3) Losses				76	24
Total				712	241

Project. The City is fast growing and additional projects have already been planned.

As regards NAGPUR City, the information given in the tabular form indicates the increase in demand during last Century or so and the anticipated demand in next three decades. The Pench project and Totaladoh project are already stressed and new projects have been planned.

NAGPUR WATER SUPPLY --																				
Population of Nagpur city																				
Year	population	Supply (In MLD)	Demand (In MLD)																	
1911	101415	16																		
1921	145193	16																		
1931	215165	16																		
1941	301957	43.3																		
1951	449099	43.3																		
1961	443659	79.6																		
1971	866144	125																		
1981	1215436	125																		
1991	1657000	242.5	290																	
2001	2200000	430	391																	
2011	3019883		528																	
2021	4076841		713																	
2031	5503735		963																	

. It is to make clear at this juncture that it is not only the water requirement for basic needs is fulfilled by the dams but there is positive benefit in the major three aspects viz. Social, Economical and Environmental as well. The details given in the following paragraph will make this point clear.

Bhandardara Dam, a masonry dam in Maharashtra State, constructed in British Regime (1925) at about Rs.85 Lakhs (about 0.2M US\$) is now contributing about Rs.125 Crores (about 25 M US\$) of GNP. A major portion of Ahamadnagar Dist. Depend on this project as Life line keeping in view the drinking water requirement also in addition to Irrigation, Industry and so on. It is therefore need of the time that a long term planning be done not only for the State and Country but for the entire World at large.

The details concerning the Historical city of AURANGABAD situated centrally south of Nagpur are also very informative. The population, which was in thousands in 19th Century, was 5,88Lakhs in 1991 and is projected at about 16.5 Lakhs(1.6 M) or even more in 2016. At the outset it may be very important to note that about 90% of drinking water comes from Jayakwadi project [1976] At the rate of 140 litres PCPD out of 92 MLD about 80 MLD is supplied from Jayakwadi Dam. Situated at Paithan. The remaining water comes from other two projects viz. Harsul and Nahare Ambari. The entire Industrial requirement of water is also met with from these dams.

In future therefore the recycling of the treated used water will become absolutely essential and advance planning is a must. In Israel about 25% of water used is treated and recycled. This paper is written to bring the factual information, over view of changing situations to the notice of all concerned and not with an intention to advocate any presumption. In country like India, the Second Largest Democracy in the World there are Social problems like Resettlement of the Project affected People. (PAPs). In some of the state like Maharashtra, Resettlement Act has been provided to achieve the smooth resettlement of the PAPs. This can be effectively achieved in general, barring few exceptions.

*The above discussions will indicate that the Dams provide essential Water Resource. They can be taken in hand only after they satisfy the Social, Environmental and economic aspects. In order to have unification the Government of India has made it necessary for big Projects (Specified in details in Government circulars.) to give the Resettlement Plan, Afforestation Plan, Benefit-Cost-Ratio, etc. The clearance from Environmental Appraisal Committee and all such relevant points are gone into details. Implementation of all these aspects is not very simple but can be tackled by effective Management and **Coordination**,*

The issues like Industrial pollution, Water logging etc. can be sorted out but the most precious Water resource can not be created except of course in Laboratory experiment .It is impossible to say the least. In case of Bhandardara dam mentioned above in Ahamadnagar Dist. (1925) there was serious Water logging problem in 1940 but it is now 0% by efficient use of Water in general

Was there any Economically Viable alternative solution to cater for such large requirement of Water Resource in this case, where dam construction was possible? This is a representative picture of majority of the big cities in India –the nature and type of Dams may vary.

Bhandardara Major project (Ind / Mah)

Umbrella fall



Bhadardara Project was the Theme Project for one of my papers viz. "Major Irrigation Projects Stepping Stone to Environmental Gain" Besides providing the Water Resource to the scarcity affected area, it is providing Hydro Electric Power. There is Holiday Resort in view of the Bird and Animal Sanctuary developed

On he Reservoir fringe. Incidentally a very popular spot for Film shooting!!

Conclusion : -

In the monsoonic climate with dwindling river flows after the rainy Season; Urbanization and Intense Industrialization is linked up closely with the assured supply of water through storages.

Unfortunately this vital aspect has been somewhat lost site off.

This Paper is to bring to the surface the very vital and significant matter for in Depth, Serious, and ofcourse, Balanced- Study ;in the real Global Interest.